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ABSTRACT

The fourth of four quins intended to develop computational skills with non-negative rational numbers through applications to business and industry, this guidebook on minimum course content is designed for the student who has acquired basic computational skills with non-negative rational numbers. Topics include ratio, proportion, and percentage applications and trigonometry. Overall course goals are specified, a course outline is provided, and performance objectives are listed. Also included is a set of sample test items for skills and a list of resources. (JP)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

DADE COUNTY PUBLIC SCHOOLS

MATHEMATICS: Rational Applications 4 5213.80
5214.80

SE 018 087

DIVISION OF INSTRUCTION • 1973

ED 093713

QUINMESTER MATHEMATICS

COURSE OF STUDY

FOR

Rational Applications 4

5213.80
5214.80

(EXPERIMENTAL)

DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida 33132

1971-72

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PREFACE

The following course of study has been designed to set a minimum standard for student performance after exposure to the material described and to specify sources which can be the basis for the planning of daily activities by the teacher. There has been no attempt to prescribe teaching strategies; those strategies listed are merely suggestions which have proved successful at some time for some class.

The course sequence is suggested as a guide; an individual teacher should feel free to rearrange the sequence whenever other alternatives seem more desirable. Since the course content represents a minimum, a teacher should feel free to add to the content specified.

Any comments and/or suggestions which will help to improve the existing curriculum will be appreciated. Please direct your remarks to the Consultant for Mathematics.

All courses of study have been edited by a subcommittee of the Mathematics Advisory Committee.

CATALOGUE DESCRIPTION

One of four quins which will develop computational skills with non-negative rational numbers through applications to business and industry.

Designed for the student who has acquired basic computational skills with non-negative rational numbers.

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GOALS

1. To improve skills in computation with non-negative rational numbers.

2. To develop greater ability in problem solving.

3. To develop an appreciation of the role of mathematics in business and industry.

OVERALL STRATEGIES

1. This quin is based on the state-adopted text, Modern Applied Mathematics by Gold and Carlberg. Chapters 8, 9, and 10 constitute the core of this course.

2. A pretest similar to the pretest included in this quin should be administered to determine the ability of the students to work with non-negative rationals. All deficiencies should be noted and activities should be planned to help each student overcome his particular deficiencies.

3. Performance objectives are listed only for computational skills. The level of performance in other areas is left to the teacher's discretion and will depend on the ability of the students he is teaching.

4. The purpose of this sequence of quins is to present new topics and practical applications of mathematics to enlarge the students' mathematical horizons while giving them an opportunity to improve their basic skills. The students have attained some measure of success in these skills in previous quins, but many will need reinforcement to maintain the skills they had and to improve them.

5. All of the four Rational Application quins have the same performance objectives, and the pretests differ only in the numbers used in the problems. It should be possible for a student to take any or all of the quins depending on his background, and it would not be necessary to maintain the sequence. For students or classes who need little work in the basic skills the topics in the book can be stressed and expanded if necessary.

6. Do not cover more than chapters 8, 9, and 10 of the text in this quin as the remaining chapters are covered in the other quins.

PERFORMANCE OBJECTIVES FOR SKILLS

The student will:

1. Add any two or more whole numbers.
2. Subtract any whole number from any larger whole number.
3. Multiply any two whole numbers.
4. Divide any whole number of 3 digits or more by any 1 or 2 digit whole number and write the answer with the remainder, if any, in fractional form.
5. Add any two or more whole numbers, fractions, and mixed numbers.
6. Subtract any whole number, fraction, or mixed number from any larger whole number, fraction, or mixed number.
7. Multiply any two or more whole numbers, fractions, and mixed numbers.
8. Divide any two whole numbers, fractions, or mixed numbers.
9. Add any two or more decimals.
10. Subtract any decimal from any larger decimal.
11. Multiply any two decimals.
12. Divide any decimal by any other decimal of 3 digits or less and round the answer to a specified place when indicated.
13. Find the average of any 10 or less whole numbers.
14. Order any two or more decimals.
15. Order any two or more fractions.
16. Simplify a given fraction when possible.
17. Solve for the unknown term in a proportion.
18. Solve the three cases of percent.
19. Express a fraction in its equivalent decimal form.
20. Round a whole number or decimal to a specified place.

Performance Objectives (continued)

21. Write the equivalent multiplication statement or decimal numeral for an exponential expression.

22. Write the equivalent fraction and decimal for a given percent.

23. Determine the perimeter of any rectangle or triangle given the appropriate dimensions.

24. Determine the area of a rectangle given the appropriate dimensions.

COURSE OUTLINE

I. Skills, as needed, throughout the quin
   1. Whole numbers
   2. Fractions
   3. Decimals
   4. Proportion and percent
   5. Perimeter and area
II. Ratio and proportion applications
   1. Screw threads
   2. Levers
   3. Similarity
      a. Triangles
      b. Polygons
      c. Scale drawings
      d. Maps
III. Percent applications
   1. Interest
      a. Simple
      b. Compound
   2. Discount
IV. Trigonometry
   1. Pythagorean Theorem
   2. Special right triangles
   3. Trigonometric ratios
   4. Trigonometric tables
   5. Trigonometric formulas

STRATEGIES

Mechanical drawing texts are an excellent source of illustrations of scale drawings. They show component parts of a machine drawn to scale.

For projects have each student select some object and draw it to scale. The student will have to select an appropriate scale as well as measure the object accurately.

The section on levers provides an excellent opportunity for demonstrations and experiments.

The student has learned to solve all three cases of percent using proportion. In this section on percent, chapter 9, the student is introduced to other methods for solving two of the three cases. Be sure to stress that the proportion method can always be used, but the new methods are convenient short cuts. If the student has difficulty with percent, encourage him to use the proportion method.

The section on interest and the section covering trigonometry give the teacher an opportunity to be sure that the students can read and use tables.

The section on the Pythagorean theorem introduces the subtraction property of equations. Further work in the solution of simple equations by application of the properties can be given if time permits. It is suggested that good form is stressed when the students use the Pythagorean theorem in solving problems.

SAMPLE TEST

1. Add. a. $\begin{array}{r} 615 \\ 903 \\ 28 \\ +\ 472 \\ \hline \end{array}$ b. $3195 + 627 + 1448$

2. Subtract:
   b. $\begin{array}{r} 7034 \\ -\ 4713 \\ \hline \end{array}$ b. $4583 - 695$

3. Multiply:
   a. $\begin{array}{r} 428 \\ \times\ 53 \\ \hline \end{array}$ b. 1608×38

4. Divide:
   a. $9\overline{)3204}$ b. $4623 \div 41$

5. Add and express the answer in simplest form:

   a. $\begin{array}{r} 4\frac{1}{4} \\ +\ 9\frac{5}{12} \\ \hline \end{array}$ b. $\frac{4}{5} + \frac{3}{5}$ c. $1\frac{1}{4} + 2\frac{2}{3} + 6\frac{1}{2}$

6. Subtract and express the answer in simplest form:

   a. $\begin{array}{r} 3 \\ -\ 1\frac{2}{3} \\ \hline \end{array}$ b. $\frac{5}{6} - \frac{1}{6}$ c. $\begin{array}{r} 7\frac{4}{5} \\ -\ 3\frac{7}{10} \\ \hline \end{array}$

7. Multiply and express the answer in simplest form:

   a. $\begin{array}{r} 3\frac{1}{4} \\ \times\ 2\frac{2}{5} \\ \hline \end{array}$ b. $7 \times 1\frac{5}{8}$ c. $\frac{5}{9} \times \frac{9}{13} \times \frac{3}{8}$

8. Divide and express the answer in simplest form:

   a. $4\frac{1}{2} \div 6$ b. $4\frac{1}{10} \div 2\frac{2}{5}$ c. $\frac{4}{7} \div \frac{5}{6}$

9. Add. a. $\begin{array}{r} 45.17 \\ 8.35 \\ +\ 26.63 \\ \hline \end{array}$ b. $81.7 + 23 + 61.7$

10. Subtract:

a. $\begin{array}{r} 70.64 \\ -\ 18.77 \\ \hline \end{array}$ b. $39.83 - 7.162$

11. Multiply:

a. $\begin{array}{r} 539 \\ \times\ .008 \\ \hline \end{array}$ b. 54.3×3.7

12. Divide:

a. $6.1\overline{)14.03}$ b. $.48\overline{).3715}$ (correct to hundredths)

13. Find the average: 66, 39, 85, 61, 47.

14. Select the larger decimal in each pair:

a. .58, .574 b. .4, .074

15. Select the smaller fraction in each pair:

a. $\frac{3}{4}$, $\frac{2}{9}$ b. $\frac{8}{11}$, $\frac{5}{7}$

16. Simplify each fraction:

a. $\frac{8}{14}$ b. $\frac{24}{28}$

17. Solve for n:

a. $\frac{6}{n} = \frac{15}{32}$ b. $\frac{4}{9} = \frac{7}{n}$

18. Solve:

a. What percent of 85 is 34?

b. Find $2\frac{1}{2}\%$ of \$1600.

c. 24 is 8% of what number?

19. Express in decimal form:

a. $\frac{4}{5}$ b. $\frac{4}{9}$

20. Round each number to the specified place:

a. 6219 to tens

b. 64.358 to hundredths

c. 18.407 to tenths

21. Express as decimal numbers:

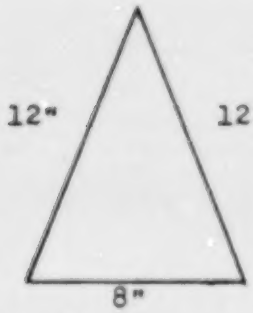
a. 3^2 b. $2^3 \cdot 5^2$

22. Express as decimals and fractions:

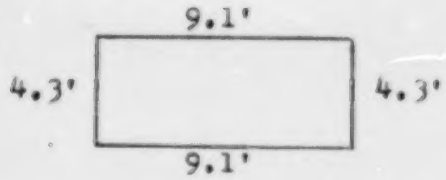
a. 8% b. $8\frac{1}{3}\%$

23. Find the perimeter:

a.

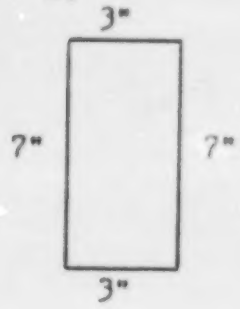


b.

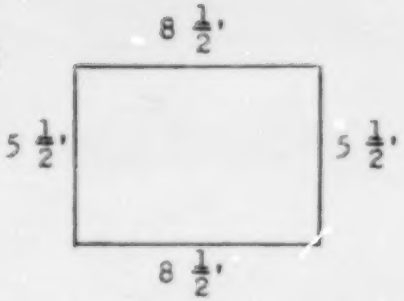


24. Find the area:

a.



b.



ANSWER KEY

1. a. 2018
   b. 5270

2. a. 2321
   b. 3888

3. a. 22,684
   b. 61,104

4. a. 356
   b. $112\frac{31}{41}$

5. a. $13\frac{2}{3}$
   b. $1\frac{2}{5}$
   c. $10\frac{5}{12}$

6. a. $1\frac{1}{3}$
   b. $\frac{2}{3}$
   c. $3\frac{7}{10}$

7. a. $\frac{39}{5}$ or $7\frac{4}{5}$
   b. $\frac{91}{8}$ or $11\frac{3}{8}$
   c. $\frac{5}{52}$

8.
8. a. $\frac{3}{4}$
   b. $\frac{205}{48}$ or $4\frac{13}{48}$
   c. $\frac{24}{35}$

9. a. 80.15
   b. 166.4

10. a. 5187
    b. 32.668

11. a. 4.312
    b. 200.91

12. a. 2.3
    b. 1.19

13. $59\frac{3}{5}$

14. a. .58
    b. .4

15. a. $\frac{3}{4}$
    b. $\frac{5}{7}$

16. a. $\frac{4}{7}$
    b. $\frac{6}{7}$

17. a. $n = 12\frac{4}{5}$
    b. $n = 15\frac{3}{4}$

18. a. 40%
    b. $40
    c. 300

19. a. .8

    b. $.4\overline{4}$

20. a. 6220

    b. 64.36

    c. 18.4

21. a. 9

    b. 200

22. a. .08 , $\frac{2}{25}$

    b. $.08\overline{3}$, $\frac{1}{12}$

23. a. 32"

    b. 26.8'

24. a. 21 sq. in.

    b. 46 $\frac{3}{4}$ sq. ft.

RESOURCES

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